Pectus Excavatum Repair

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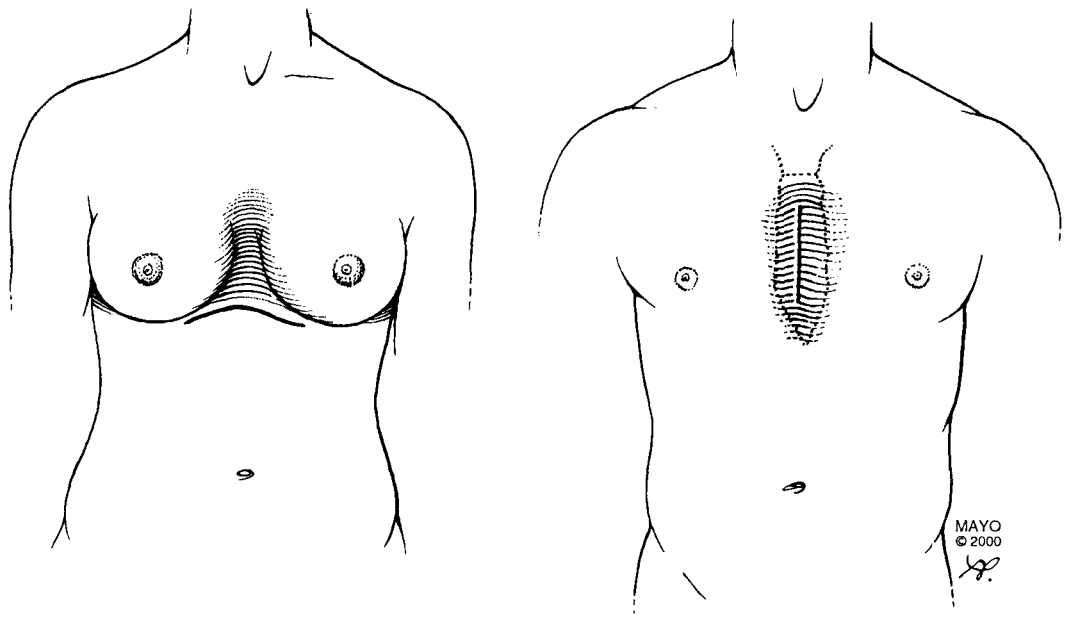
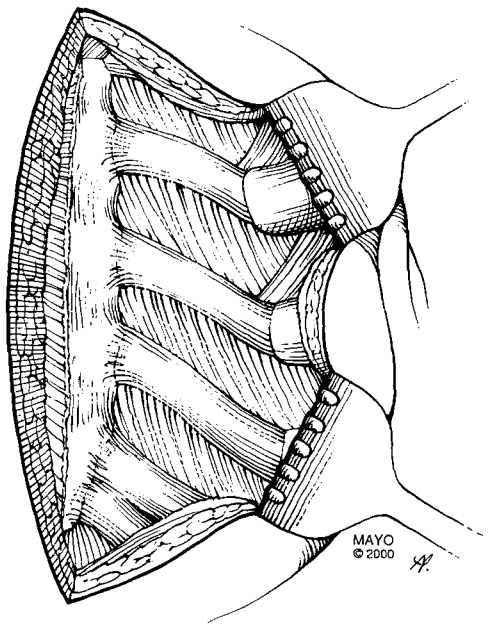
Pectus excavatum (also known as funnel chest or chondrosternal depression), the most common congenital chest wall deformity, involves depression or inward caving of the anterior chest wall. The abnormality is caused by overgrowth of the costal cartilages. The author's experience has been limited to teenagers and adults. In these populations, surgical repair is recommended for severe deformation or for a defect associated with cardiopulmonary symptoms. However, most studies have failed to document consistent improvement in cardiopulmonary function resulting from surgical repair. Cosmesis is certainly a valid indication for surgery, especially when the appearance of the deformation affects the patient's well-being.

Although computed tomography with three-dimensional reconstruction provides a satisfactory way to compare the anatomy before and after surgical correction, physical examination is essentially all that is needed to confirm a diagnosis of pectus excavatum and establish indications for surgical correction. Associated conditions include Marfan's syndrome and scoliosis. All patients with Marfan's syndrome or marfanoid body habitus should be evaluated, but fewer than 5% of patients with scoliosis are sufficiently affected to warrant evaluation.

SURGICAL TECHNIQUE

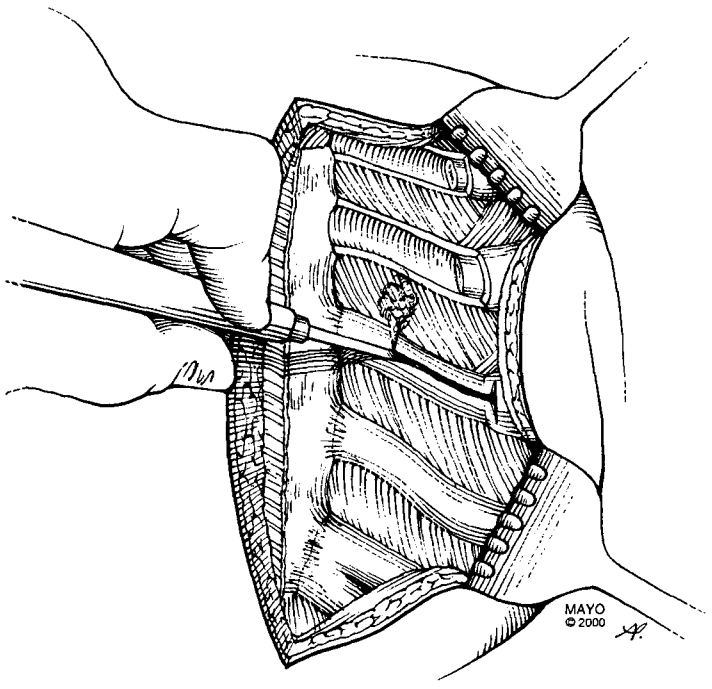


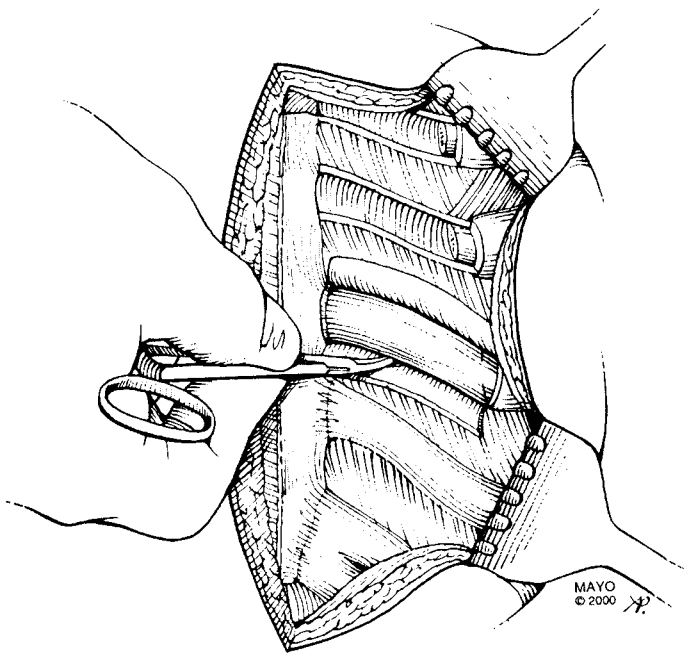
1 The goals of surgical repair are to correct the sternal depression and to maintain the sternum in its corrected position. A submammary skin incision is used for women; a standard midline sternotomy incision for men.



2 A flap including the skin, subcutaneous tissue, and pectoralis major muscle is raised on each side to uncover cartilages 2–7.

3 Each cartilage is scored longitudinally with electrocautery, starting at the very end of the bony portion of the rib.





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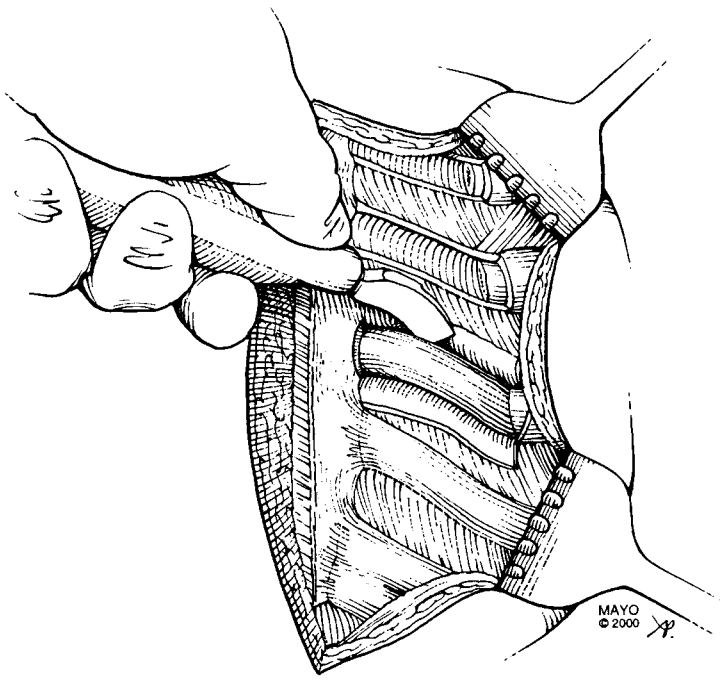

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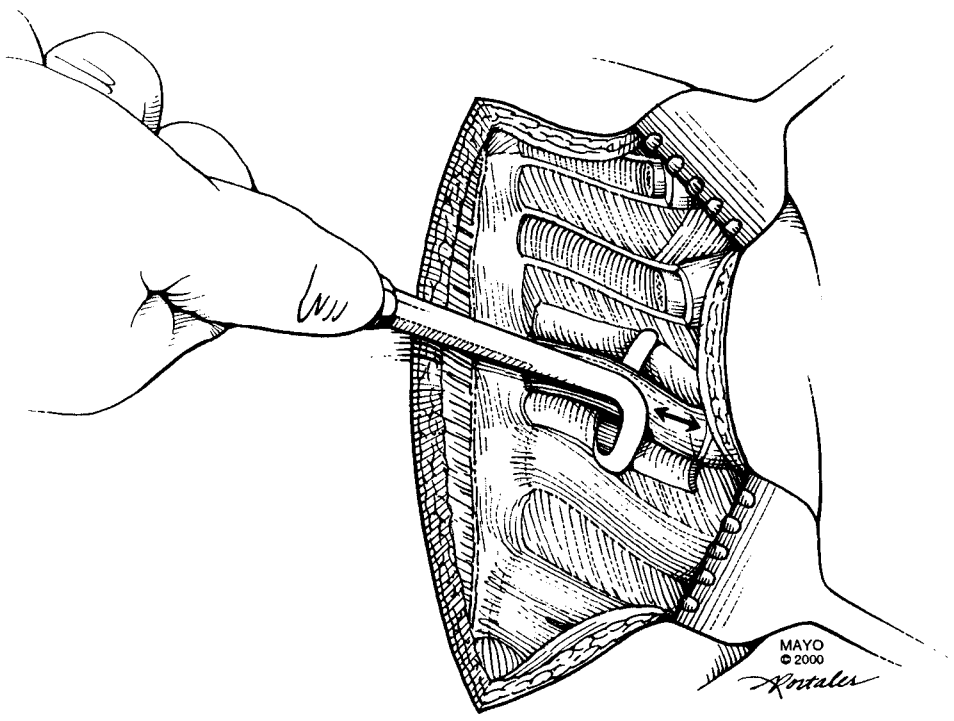

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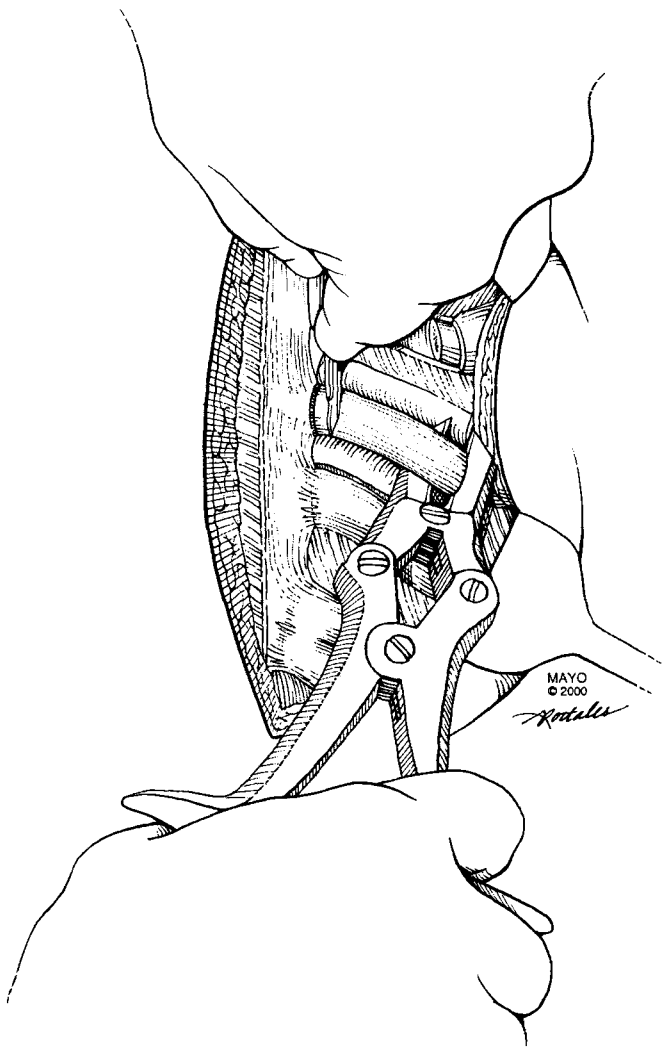
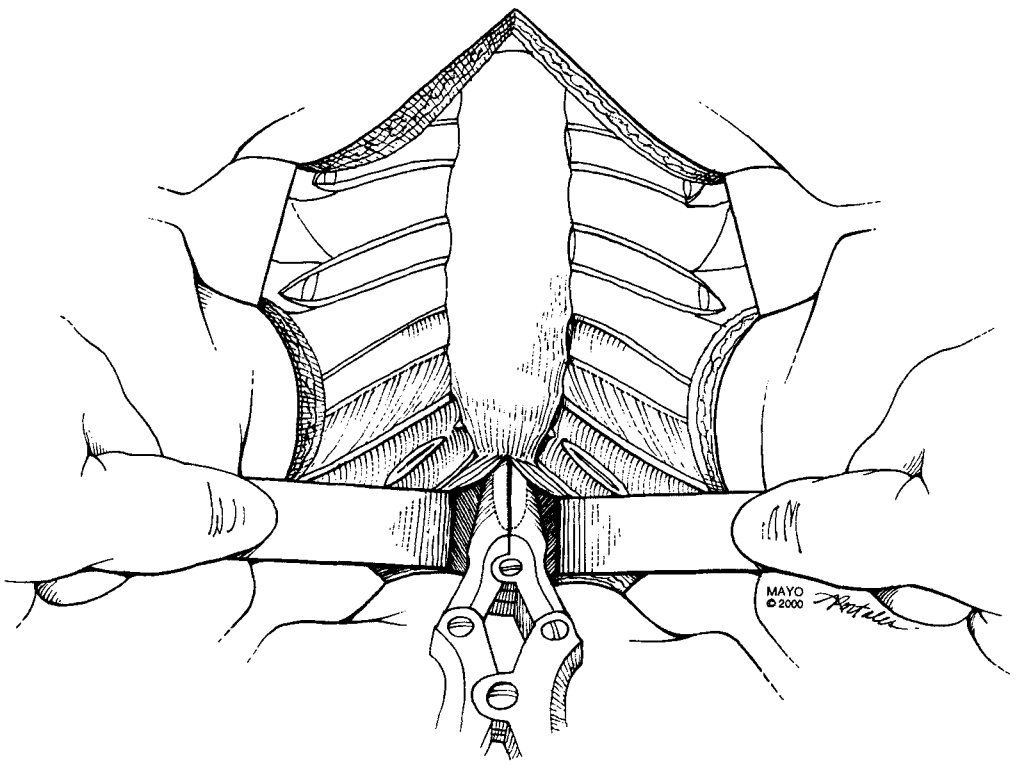
4, 5, 6 Using successively an hemostat clamp, a periosteal elevator, and a Doyen dissector, a flap of perichondrium is raised and elevated off the cartilage circumferentially, with the goal of resecting the entire cartilage while preserving most of the perichondrium for future cartilage regrowth.

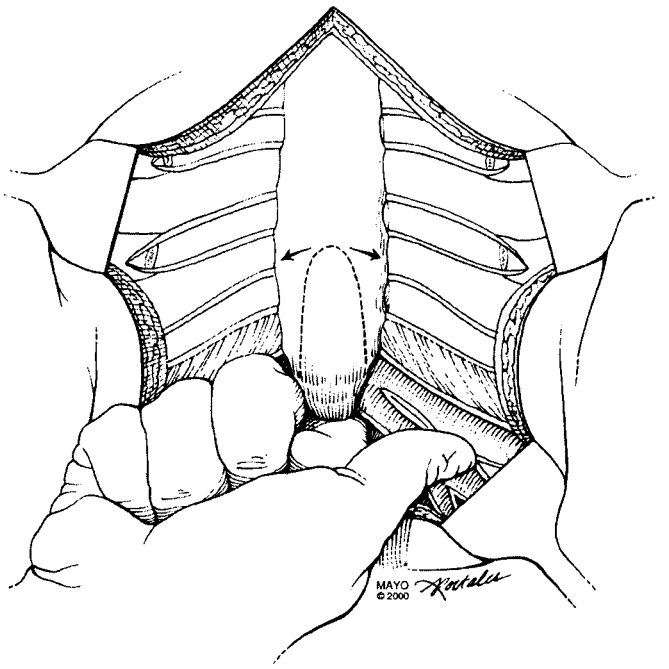


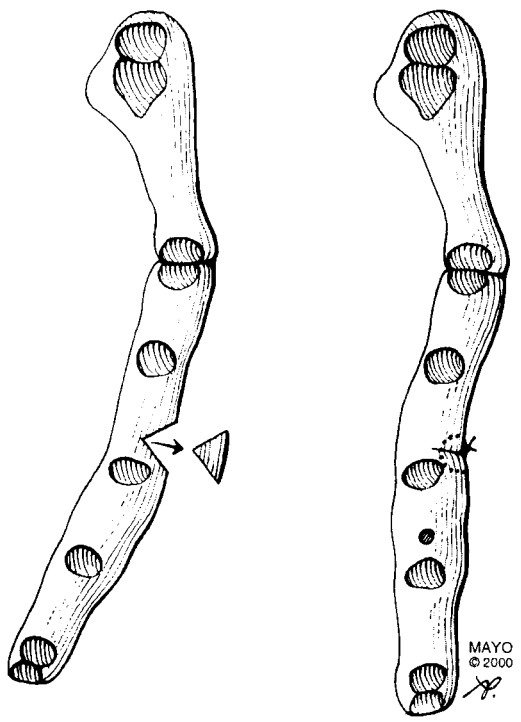
7 The cartilage is divided at the bony end of the rib laterally with a rib cutter and at the sternochondral junction medially with a scalpel blade. Care is taken at that level to avoid injury to the mammary blood vessels. Before moving to the next cartilage, the surgeon temporarily packs small pieces of gelfoam dipped in thrombin solution into the space left by the resected cartilage for hemostasis.



8 The xyphoid process is removed with a rongeur instrument. The rectus abdominis muscle attachments are separated from the costal arch just enough to facilitate resection of the involved cartilages inferiorly.

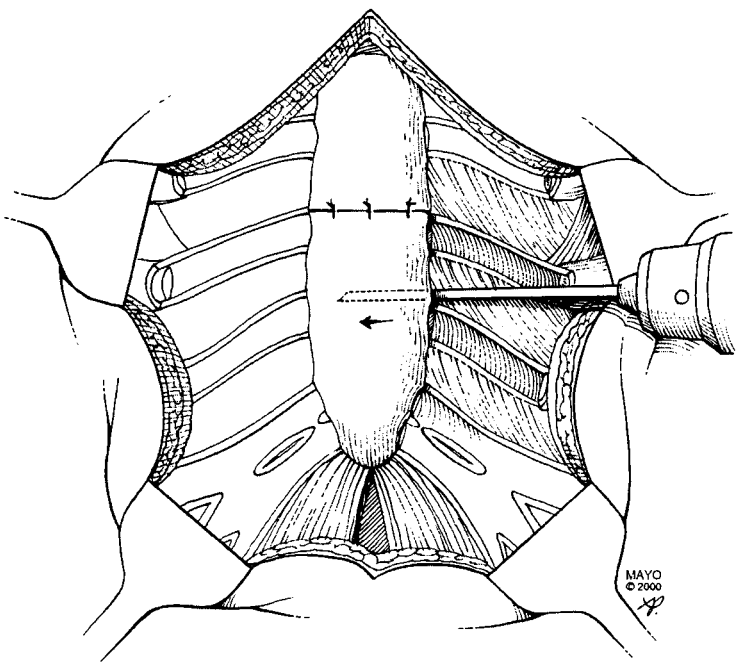
9 The sternum is mobilized by sweeping the loose connective tissue posteriorly from side to side.

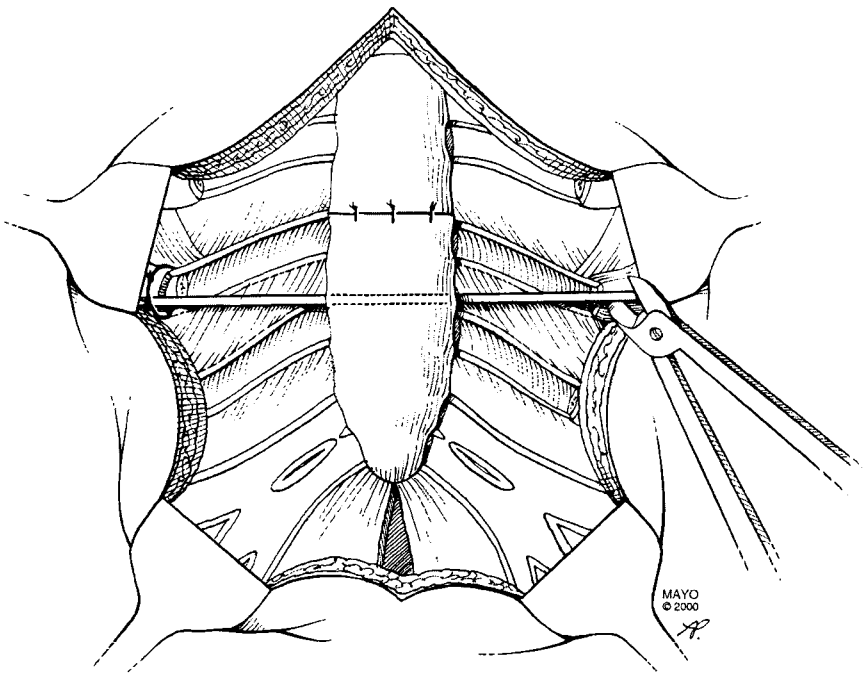




10 In most cases, an anterior osteotomy is needed to elevate the sternum.

11 A Steinman pin (Zimmer, Warsaw, IN) is inserted transversely through the caudal portion of the sternum for stabilization, and positioned to rest on the bony end of a rib on each side.





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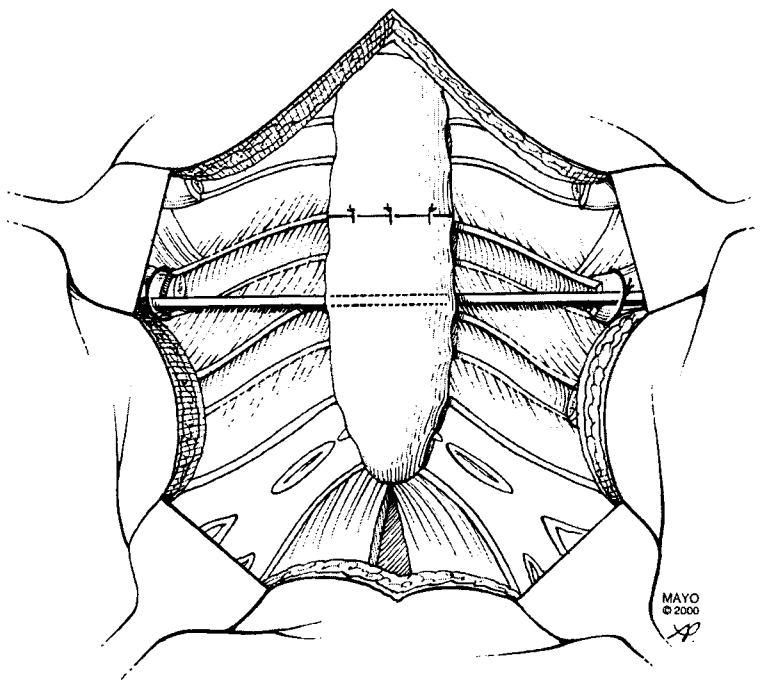

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12, 13 The pin is secured in place with nonabsorbable sutures tied around the rib on each side. The pin may need to be shortened to avoid protrusion through the soft tissue of the chest wall. Closed suction drains are left under the muscle flap on each side. A chest tube is used only if the pleura have been violated during the repair. The pectoralis muscle and skin flap are then stitched back together to cover the sternum.

Postoperative Care

A thoracic epidural catheter is encouraged for pain control. Ambulation is initiated on the first postoperative day. Usually drains are removed after 48 hours and the patient is dismissed within 4–5 days after the operation. After a month of recovery, contact sports are allowed provided that the patient wears a custom-made protective shell for a year. The pin is usually kept in place for at least 6–9 months and is removed under local anesthesia after that period.

Major complications are extremely rare. Minor complications include superficial wound infection, seroma, and displacement of the metallic pin, requiring replacement or early removal. Most patients (85%) experience improvement and express gratitude that the deformation has been corrected.

RECOMMENDED READINGS

1. Haller, JA, Jr, Sherer, LR, Turner, CS, et al: Evolving management of pectus excavatum based on a single institutional experience of 664 patients. Ann Surg 209:578-583, 1989
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5. Ravitch, MM: Congenital deformities of the chest wall and their operative correction. Philadelphia, PA, WB Saunders, 1977

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